

**BIASING FOR TRI-LAYER MAGNETORESISTIVE SENSORS****ABSTRACT OF THE DISCLOSURE**

A biasing system for a tri-layer reader stack magnetoresistive sensor is disclosed. The tri-layer reader stack includes a first ferromagnetic free layer, a second ferromagnetic free layer, and a magnetoresistive layer between the first and second ferromagnetic free layers. The free layers are positioned in the tri-layer reader stack such that quiescent state magnetizations of the free layers are antiparallel. A biasing layer is positioned with regard to the tri-layer reader stack, typically separated from the tri-layer reader stack by a nonmagnetic spacer layer. A biasing means is positioned such that a magnetization of the biasing layer is perpendicular to the quiescent state magnetizations of the free layers. This biasing results in the free layers having biased magnetizations directed substantially orthogonal with respect to each other.